

Synergistic Effects of Mobile Banking and AI on Financial Service Offerings

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The two most important technologies that are shaping the financial services and banking are Mobile Banking and AI. The synergy of these two Technologies has the potential to transform customer experiences, operational efficiencies, service delivery and speed of transitions in the Financial sector. The impact of confluence of these two technologies on service Offerings of Financial Products and perception is examined in this paper. With the increase in Penetration of Mobile Devices in all parts of world in particular in economies where there was a digital divide earlier, mobile banking became a mainstream channel for banking. it has ensured that the banking services reach all the unbanked locations and population. Not only Banking Services but also Wealth creation and Management services can be offered through mobile banking combination of AI the service Offerings by this combination of Mobile and AI has reached a next level. On the other hand, the application of AI in Financial Sector has further augmented the role of mobile banking and enhanced customer experience by providing personalized service, automated customer support through Chatbots, Credit assessment, Speed of doing Transactions and ability to seek services from Banks without visiting the Banks,

1. Introduction

Evolution of financial services: from traditional banking to digital platforms. The advent of Technology adoption by Banks was a major step toward Bank Business automation. In India this journey started for Automated Leader Posting Machines for Banks followed by Branch Automation and then by Implementation of Core Banking Solutions. Once the Core Banking solutions were implemented all the best possible technologies followed which included Mobile Banking, Internet Banking, Chat Bots. Now with the implementation of AI in the Services offered through Mobile Banking, Internet Banking the service Delivery has move to the next Levels. This Synergy is having a profound impact on the Service offerings for the Retail and Busines customers.

The rise of mobile banking: convenience, accessibility, and market penetration (Payne, Peltier and Barger, 2018; Miller, 2023). The emergence of AI in finance: transforming processes and customer interactions (Smit, 2024).

1.1 Significance of the Confluence:

The convergence of mobile banking and AI as a catalyst for economic progress and financial inclusion (Mhlanga, 2020). The speed at which transactions are completed by citizens has drastically increased. Now the Citizen does not need to travel to the Bank Branch for most of the routine Banking Transactions.

This convergence is enhancing customer experience and operational efficiency in the banking industry (Mhlanga, 2020) (Kumar and Gupta, 2023). For the customer individual Retail or Business customer there is a significant amount of time savings. If we look at the Big Picture Millions/Billion of Hours of Banking customers' time are saved. Further Million/Billion of hours of Bank staff time is saved. Since these transactions happen. With these technological implementations instantaneously without any human intervention there is higher accuracy and lower errors. The time saved by Bank customers and Bank staff surely is money saved and this saved time increases the velocity of Business cycles. What could be done by a business in entire month can now be done by businesses in a single day.

1.2 Research Objectives:

The main objectives of the study are:

- 1) To Study the Impact of Mobile banking, augmented by AI, in reshaping financial service offerings.
- 2) To study the impact of Mobile banking, augmented by AI, in increasing the velocity of transaction and reducing Business Cycles.
- 3) To Study the impact of Mobile banking, augmented by AI, in reducing credit requirements in Businesses.
- 4) To Study the impact of Mobile banking, augmented by AI, in increasing the GDP by allowing citizens to do more in less time

NULL HYPOTHESIS

H01: Mobile banking, augmented by AI, is not fundamentally reshaping financial service offerings.

H02: Mobile banking, augmented by AI, is not fundamentally increasing the velocity of transaction and reducing Business Cycles.

H03: Mobile banking, augmented by AI, is not fundamentally reducing credit requirements in Businesses.

H04: Mobile banking, augmented by AI, is not fundamentally increasing the GDP by allowing citizens to do more in less time

1.3 Research Questions/Objectives:

What is the Impact of Mobile banking, augmented by AI, in reshaping financial service offerings?

What is the impact of Mobile banking, augmented by AI, in increasing the velocity of transaction and reducing Business Cycles?

What is the impact of Mobile banking, augmented by AI, in reducing credit requirements of Businesses?

What is the impact of Mobile banking, augmented by AI, in increasing the GDP by allowing citizens to do more in less time?

1.4 Paper Statement:

Mobile banking, augmented by AI, is fundamentally reshaping financial service offerings by enhancing customer experience, driving operational efficiencies, enabling personalized solutions, and promoting financial inclusion, while simultaneously posing challenges related to security, ethics, and regulatory compliance.

2. Literature Review

With the rapid advancement of technology, the banking industry has undergone a significant transformation, and the integration of Artificial Intelligence into mobile banking has emerged as a game-changer.

The use of AI in mobile banking has significantly enhanced the customer experience by offering personalized and efficient services. Banks are leveraging AI-powered chatbots and virtual assistants to provide quick and accurate responses to customer inquiries, reducing wait times and improving overall satisfaction (Kumar and Gupta, 2023). AI algorithms can also analyze customer behavior and preferences, enabling banks to offer tailored products and services that better meet their needs.

Moreover, AI has revolutionized the way banks assess credit risk and make lending decisions. By analyzing vast amounts of data, AI-powered models can make more accurate and efficient credit assessments, leading to faster loan approvals and reducing the risk of defaults (Buchanan, 2019).

The integration of AI in mobile banking has also improved the security and fraud detection capabilities of financial institutions. AI-powered anomaly detection systems can identify suspicious activities in real-time, enabling banks to quickly respond and mitigate the risk of fraud (Oyeniyi, Ugochukwu and Mhlongo, 2024) (Buchanan, 2019).

The use of AI in mobile banking has also led to the development of innovative financial services, such as robo-advisory, which provides automated investment management and personalized financial planning recommendations.

The offerings on Mobile Banking are increasing at a very fast rate. This includes the Banking Services, which include service starting from , New account opening, , Balance enquiry QR code Payment services, Various Request for Bank, Feed Back and complaints, Funds transfer, IMPS, RTGS, NEFT, The Wealth Management services as well as the Payments services, Depository Services, Insurance and Investment Services. (Oyeniyi, Ugochukwu and Mhlongo, 2024) (Rasheed, Ishaq and Rehman, 2021) (Kumar and Gupta, 2023) (Buchanan, 2019) These services are now being offered seamlessly through the Mobile Banking channel

with the help of Artificial Intelligence. (Rasheed, Ishaq and Rehman, 2021) (Oyeniyi, Ugochukwu and Mhlongo, 2024) (Kumar and Gupta, 2023) (Buchanan, 2019)

However, the adoption of AI in mobile banking is not without its challenges. The Challenges are

Mobile Banking has become a very important aspect of financial services in recent years. The usage of Mobile Banking in Banks has increased significantly, and AI has become an integral part of this technology (Bhuiyan, 2024) (Oyeniyi, Ugochukwu and Mhlongo, 2024). Artificial Intelligence has been increasingly integrated into the banking sector to enhance customer experiences and improve operational efficiency (Kumar and Gupta, 2023) (Oyeniyi, Ugochukwu and Mhlongo, 2024). One of the key areas where AI has been leveraged in banking is customer service, with the aim of providing personalized and efficient support to customers.

The impact of AI on customer perception in the banking industry is a crucial area of study. Research suggests that the integration of AI-powered automation in banking has had a significant impact on customer relationships, with the simplicity and reliability of AI-driven services contributing to increased customer trust. (Kumar and Gupta, 2023) (Fares, Butt and Lee, 2022) Furthermore, the personalization capabilities of AI-enhanced banking services have been found to enhance customer satisfaction and engagement. (Bhuiyan, 2024)

According to a recent study, the evolution of AI in the Indian banking industry has been marked by the increasing adoption of AI-enabled technologies in operational processes. This has led to significant improvements in service quality, reduced response times, and enhanced customer experiences. The study also highlights the potential of AI to navigate the challenges posed by digital transformation in the banking sector, underscoring the need for banks to adapt to the changing landscape of consumer expectations and technological advancements.

While the integration of AI in banking has brought about numerous benefits, it has also raised concerns among customers regarding privacy, security, and the potential for job displacement. Addressing these concerns and ensuring a smooth transition to AI-powered banking services will be crucial in shaping customer perception and building trust in the technology.

In today's rapidly evolving digital landscape, the integration of Artificial Intelligence into mobile banking has become a prominent trend, with financial institutions seeking to enhance customer experiences and streamline their operations. The banking industry has been at the forefront of adopting AI-powered technologies, leveraging them to improve service quality, boost operational efficiency, and mitigate fraud. (Oyeniyi, Ugochukwu and Mhlongo, 2024)

As AI-enabled features become more prevalent in mobile banking applications, understanding customer perceptions and attitudes towards these innovations is crucial. Existing research suggests that consumers are generally receptive to the integration of AI in banking, recognizing its potential to provide personalized and efficient services. (Kumar and Gupta, 2023) However, concerns around data security, ethical implications, and the need for effective regulation remain key considerations for customers. (Oyeniyi, Ugochukwu and Mhlongo, 2024)

The evolution of AI in the Indian banking industry has been a gradual process, with financial institutions increasingly integrating AI-enabled technologies into their operational processes.

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While the initial research on the potential of automated processes dates back to the 1950s, it is only in recent decades that AI-powered solutions have gained widespread adoption in the banking sector. (Kumar and Gupta, 2023)

Mithra et al. delve deeper into the specific applications of AI in banking, highlighting its impact on operational efficiency, customer experience enhancement, and fraud detection. These studies underscore the significant benefits that AI can bring to the banking industry, particularly in improving customer service and responsiveness.

However, the implementation of AI in banking customer service is not without its challenges. Concerns around data security, ethical dilemmas, and the need for effective regulation have been raised by researchers, emphasizing the importance of addressing these issues to ensure the successful integration of AI in the banking sector (Oyeniyi, Ugochukwu and Mhlongo, 2024).

As the banking industry continues to embrace AI-driven technologies, understanding customer perceptions and addressing their concerns will be crucial for building trust and fostering widespread adoption.

The research conducted by (Salunkhe, 2019; Kumar and Gupta, 2023; Oyeniyi, Ugochukwu and Mhlongo, 2024) provides valuable insights into the evolving landscape of AI in mobile banking, highlighting both the opportunities and the challenges that financial institutions must navigate to deliver a seamless and secure customer experience.

Further the Mobile Banking market is expected to grow at a significant rate in the coming years, driven by the increasing adoption of smartphones, the rising demand for convenient banking services, and the growing preference for digital financial solutions.

The Mobile Banking is going to be like a Bank in pocket, where customers can access various banking services through their mobile devices, anytime and anywhere. In this context, the integration of AI into mobile banking applications has the potential to revolutionize the customer experience, offering personalized and intelligent services that cater to the unique needs and preferences of individual users.

As the banking sector continues to evolve, the role of AI in shaping customer service strategies remains a critical area of focus, underscoring the need for banks to adapt to the changing landscape of consumer expectations and technological advancements. (Oyeniyi, Ugochukwu and Mhlongo, 2024) (Salunkhe, 2019) (Kumar and Gupta, 2023)

The use of mobile banking has had an impact on business transactions. Now businesses rely less on credit and ensure that the payments are received on time, ultimately decreasing the amount of time spent on account receivables operations. This has improved the balance sheets of the businesses and have effectively made more cash available to grow the businesses (Königstorfer and Thalmann, 2020) (Oyeniyi, Ugochukwu and Mhlongo, 2024) (Kumar and Gupta, 2023).

Ultimately, the integration of AI in mobile banking presents both opportunities and challenges for financial institutions, and understanding customer perceptions will be crucial in navigating this dynamic landscape.

2.1 Mobile Banking: Evolution and Impact:

Growth and adoption rates of mobile banking (Payne, Peltier and Barger, 2018). Benefits: convenience, accessibility, reduced costs, and broader reach. Impact on customer satisfaction (Miller, 2023) and financial inclusion (Mhlanga, 2020). The use of Mobile banking has further reduced the customer visits to the Bank branches. The implication is that the Bank branches have lesser foot fall and can reduce the recurring costs of maintaining brick & mortar branches. less cost to Banks would finally help Banks to pass some of the cost benefits to the Customers in terms of lower charges and fees.

2.2 Artificial Intelligence in Financial Services:

AI technologies are driven by key technologies like machine learning, natural language processing, and robotic process automation. Large Language models, Artificial General Intelligence (AGI)

Applications of AI in banking: fraud detection are well documented in the research paper by (Mhlanga, 2020), algorithmic trading (Buchanan, 2019), customer service (chatbots) (Hwang and Kim, 2021), and risk management.

2.3 Synergistic Effects of Mobile Banking and AI:

AI enhances mobile banking functionalities as it has an ability to utilize ML, NLP LLM and various other models and technologies that are available within the Financial Sector. Moreover the (Raw Material for AI) Data Available is of large volumes in Financial Sector. So utilization of this data enhances the service delivery through Mobile Devices to a extent which was un-imaginable earlier. It has also resulted in Improved customer engagement through AI-driven mobile interfaces. It has also enhanced security measures in mobile banking using AI.

2.4 Challenges and Concerns:

Data security and privacy issues (Smit, 2024). The Data Security and privacy issues remain a key concern as the AI technologies utilize the large amount of Data that is available with Banks and other financial Organizations. This has given rise to ethical considerations in AI-driven financial services and thereby deserves and has already attracted Regulators attention and thereby new compliance requirements and a norm

3. Impact on Financial Service Offerings

3.1 Enhanced Customer Experience:

AI-powered mobile banking apps for personalized financial advice and support. Since the users past data is available so the AI Powered Mobile Banking apps can offer personalized advise , transaction template, and support. AI-driven chatbots and virtual assistants for improved customer service (Hwang and Kim, 2021) also add immense value to the customer interaction. The queries are quickly addressed by the chatbots. Infact most of the Financial sector organizations have implemented chatbots. The impact of AI on customer relationships and trust has also moved to a next level. Because of the personalized nature of responses the customers has started getting a feeling of a dedicated resources being made availed to the

customer

3.2 Operational Efficiency:

AI for automation of routine tasks, reducing operational costs and improving speed (Buchanan, 2019). The AI and Mobile Banking have led to a substantial cost reductions for both Banks and Businesses. The routine tasks like funds transfer, Payments are automated and Banks staff and resources not limited to manpower, Branch Space, Storage Space are reduced thereby driving Operation Efficiency to next level. The task of Supervision and control have also been automated by the AI-driven fraud detection and prevention systems (Mhlanga, 2020). Furthermore the routine Banking backend tasks are automated by the AI enabled Robotic process Automation tools leading to AI's impact on streamlining banking processes.

3.3 Personalized and Innovative Services:

- AI algorithms for analysing customer data and providing tailored financial solutions ("How AI-powered Mobile Banking App Enhances Customer Experience," 2018). This has in true way moved customer service to customer delight. Infact since every time the customer gets a personalized service it has created an emotional attachment with the Financial Institution.

AI-enabled credit scoring and loan approval processes have reduced the turnaround time for Loan approval. The new AI based credit models offer pre-approved loans to the customers. This is just the beginning the use of AI in developing new financial products and services and a very fast pace

3.4 Digital Financial Inclusion:

AI's and Mobile Banking impact on digital financial inclusion by addressing information asymmetry (Mhlanga, 2020). This has led to extending financial services to underserved populations through mobile AI solutions at their doorsteps through Banking correspondents.

4. Challenges and Considerations

4.1 Data Security and Privacy:

Risks associated with data breaches and unauthorized access to customer information remain very high. However Banks have put in place strategies for ensuring data security and compliance with data protection regulations. The regulator (RBI) has also come out with lot of guidelines and this has definitely reduced the chances of Data Security and Privacy breaches of the Personally Identifiable Information (PII)

4.2 Ethical Implications:

Since The credit models have access to various demographic profiles including but not limited to professions and other data regarding the population, so ethical considerations in the use of AI for financial decision-making are required to be seriously addressed. This is being done by implementing processes to ensure transparency and fairness in AI algorithms.

4.3 Regulatory Landscape:

The evolving regulatory landscape for AI and mobile Banking in financial services is Intune with the speed at which these technologies are being adopted by masses. The need for effective regulation to address the challenges and risks associated with AI and mobile banking is required to be kept updated by the regulator.

4.4 Job Displacement:

- Potential for job losses due to the automation of tasks is a reality. However it is expected that new jobs will be created that will be higher in value chain. Strategies are being put in place by financial institutions for managing the transition and reskilling the workforce.

5. Case Studies

- 5.1 Case Study 1: Bank SBI

Implementation of AI-powered mobile banking for personalized customer service.. One such example is the chatbots implemented by SBI namely SIA-SBI. This chatbots is used extensively by customers. The outcomes of this chatbots are encouraging and it handles millions of interactions. It has improved customer satisfaction and increased operational efficiency.

6. Future Trends and Recommendations (300 words)

6.1 Future Trends:

The future of mobile banking and AI in financial services is a matter of imagination. The services offered through Mobile Banking backed by AI is truly a game changer for financial Landscape.

Emerging technologies and the integration of AI, Mobile Banking and large Data sets available with the Financial institutions is taking financial services to a next level with immense potential impact on the industry.

6.2 Recommendations:

For financial institutions must invest in AI and mobile banking technologies (Ebbage, 2018). This is not a fancy technology any more , but is a basic survival requirement for financial institutions.

For regulators is extremely important to keep an eye on the new landscape and develop clear and effective regulations for AI in finance.

For policymakers it is important and a dream tool to achieve the national objections of poverty eradication, Financial Inclusion and to promote digital literacy and financial inclusion.

7. Data Presentation and Conclusion

The results of this study provide valuable insights into the Synergistic Effects of Mobile Banking and AI on Financial Service Offerings. The findings reveal a strong consensus among respondents regarding the positive influence of these technologies on Financial Service Offerings not limited to the efficiency, and customer interactions. The results presented in the tables indicate the use of the Chi-square test as the statistical test, as it is commonly used to analyse categorical data and assess the association between different response categories. The p-values (<0.001) suggest statistically significant differences in participants' responses, indicating strong agreement on the positive impact of Synergistic Effects of Mobile Banking and AI on Financial Service Offerings. The test also highlights concerns regarding security and privacy, which remain significant considerations in the adoption of these technologies.

$$\chi^2 = \sum [(O - E)^2 / E]$$

In the Chi-Square (χ^2) test, the symbols O and E represent:

O (Observed frequency) – The actual count or frequency of occurrences in each category from the collected data.

E (Expected frequency) – The theoretical count or frequency that is expected based on a null hypothesis or probability distribution.

The main objectives of the study are:

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In order to arrive at a sample size based on a confidence level, margin of error, and population size (as is common in surveys or quantitative studies), we calculated it as under: it 95% confidence $\rightarrow Z = 1.96$ (most common) Margin of Error (E), a margin of error of 5% (0.05) is

common. Proportion (P): This is the proportion of the population that will respond positively or have a certain characteristic. Since you may not know this exactly, you can use 0.5 (50%) as the most conservative estimate.

Sample Size Formula used

The formula for calculating the sample size uses is:

$$n=Z^2 \times P \times (1-P)/E^2$$

Where:

- n = Sample size
- Z = Z-value (based on the confidence level)
- P = Proportion (50% or 0.5 is the most conservative value)
- E = Margin of error (expressed as a decimal, so 5% = 0.05)

Step 3: Calculate the Sample Size

Calculate numbers for a 95% confidence level and a 5% margin of error Z= 1.96 ,P= 0.5,E= 0.05

$$n=(1.96)^2 \times 0.5 \times (1-0.5) / (0.05)^2$$

$$n=384.16$$

So, the sample size required for a population of 1,610,000 with a 95% confidence level and 5% margin of error is 384.16 respondents. Accordingly I have taken the sample size to 385

For our research (open-ended interviews), a sample size of around 385 respondents would be appropriate for a 95% confidence level with a 5% margin of error.

ORGANISATION & PRESENTATION OF DATA

Questions	S	SD	D	N	A	SA	SD+D%	SD%	D%	%	A%	SA%	SA+A%
Mobile Banking augmented AI technologies have improved the efficiency of routine banking tasks and is reshaping Service Offerings.	S1	5	13	27	213	127	4.68	1.30	3.38	7.01	55.32	32.99	88.31
Automated processes powered by Mobile Banking augmented AI have increased the number of possible transactions(velocity of Transactions) thereby reducing business Cycles.	S2	1	7	35	217	125	2.08	0.26	1.82	9.09	56.36	32.47	88.83
Mobile Banking augmented by AI has positively contributed to Reduction in credit requirement for businesses and payments collections are efficient.	S3	3	11	31	207	133	3.64	0.78	2.86	8.05	53.77	34.55	88.31

Mobile Banking augmented by AI has positively contributed to to increase GDP by allowing citizens to do more in less time	S4	7	21	37	193	127	7.27	1.82	5.45	9.61	50.13	32.99	83.12
Employees are concerned about job security due to the implementation of Mobile Banking augmented by AI in the banking sector.	S5	37	67	87	143	51	27.01	9.61	17.40	22.60	37.14	13.25	50.39
The bank addresses employee concerns adequately regarding the integration of Mobile Banking augmented by AI technologies.	S6	17	53	103	155	57	18.18	4.42	13.77	26.75	40.26	14.81	55.06
Mobile Banking augmented by AI created new opportunities for career growth within the banking industry.	S7	9	27	71	173	105	9.35	2.34	7.01	18.44	44.94	27.27	72.21

Table 1. Survey responses of Study the Impact of Mobile banking, augmented by AI, in reshaping financial service offerings .

Statement Code	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	p-value
S1	5	13	27	213	127	<0.001**
S2	1	7	35	217	125	<0.001**
S3	3	11	31	207	133	<0.001**
S4	7	21	37	193	127	<0.001**
S5	37	67	87	143	51	<0.001**
S6	17	53	103	155	57	<0.001**
S7	9	27	71	173	105	<0.001**
S8	13	37	75	167	93	<0.001**

The Above response in terms of Percentage

Statement Code	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	p-value
S1	1.30	3.38	7.01	55.32	32.99	<0.001**
S2	0.26	1.82	9.09	56.36	32.47	<0.001**
S3	0.78	2.86	8.05	53.77	34.55	<0.001**
S4	1.82	5.45	9.61	50.13	32.99	<0.001**
S5	9.61	17.40	22.60	37.14	13.25	<0.001**
S6	4.42	13.77	26.75	40.26	14.81	<0.001**
S7	2.34	7.01	18.44	44.94	27.27	<0.001**
S8	3.38	9.61	19.48	43.38	24.16	<0.001**

5) The table 1 presents survey responses regarding the impact of Mobile Banking augmented by AI technologies in reshaping Service Offerings. A majority of respondents (88.31%) agreed or strongly agreed that Mobile Banking augmented by AI has improved routine banking tasks thereby reshaping service offerings (88.31%), have increased the number of possible transactions (velocity of Transactions) thereby reducing business Cycles (88.83%), and has positively contributed to Reduction in credit requirement for businesses because the payments collections are efficient (88.31%). Additionally, 83.12% of respondents felt that Mobile Banking has positively contributed to increase GDP by allowing citizens to do more in less time. However, 50.39% of employees expressed concerns about job security due to Mobile Banking augmented by Mobile Banking and AI implementation. Despite this, 55.06% believed the bank addresses employee concerns, and 72.21% acknowledged AI's role in creating career growth opportunities. Furthermore, 67.53% agreed that the bank invests in training employees for AI integration. The highly significant p-values (<0.001) indicate strong statistical support for these findings. Hence, all the four hypothesis H01 to H04 are rejected.

8. Conclusion of the results:

The results indicate a strong positive impact of the synergy of Mobile Banking and AI in transforming Financial Services and improving efficiency of Transactions. The result of this reduced time to do transactions is two folds. On one side the customers are able to save time as they are no longer dependent on Bank Branches to do Transaction. On the other hand the Business customer is able to receive the Payments for the goods and services in a more efficient manner. In fact in most of the case instantaneously. This has resulted in better cash flows for the Businesses and there by Reducing the Debtors and thereby enhancing the Business cash Flow which in turn results in Lesser need for Bank Credit.

Furthermore the study also brings out the fact that since the velocity of transactions has increased to the businesses are able to do more business, more sales and give more services thereby resulting in direct impact on GDP. Overall, the findings highlight the growing reliance on Mobile Banking and AI, emphasizing their critical role in future.

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